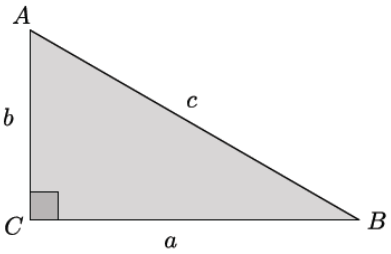
GEOMETRY

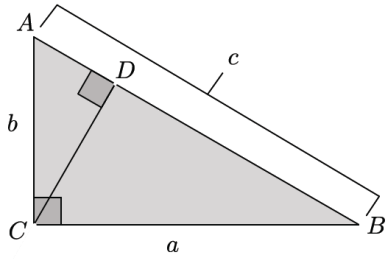
8 TH GRADE

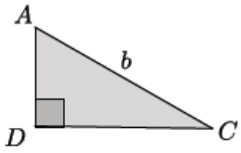
Lesson 15: Pythagorean Theorem, Revisited

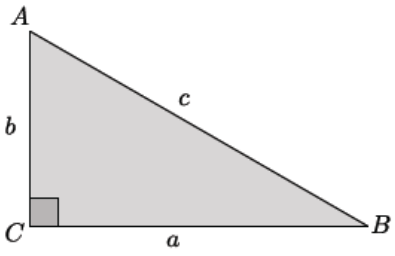
Classwork

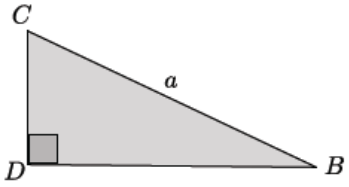
Proof of the Pythagorean Theorem

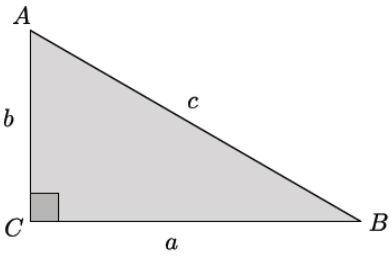


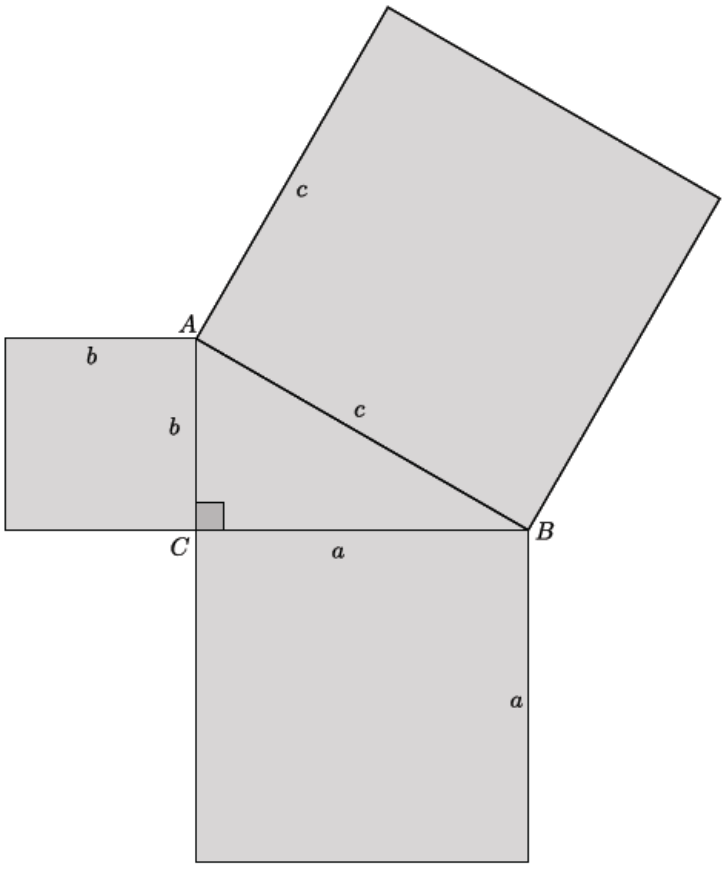








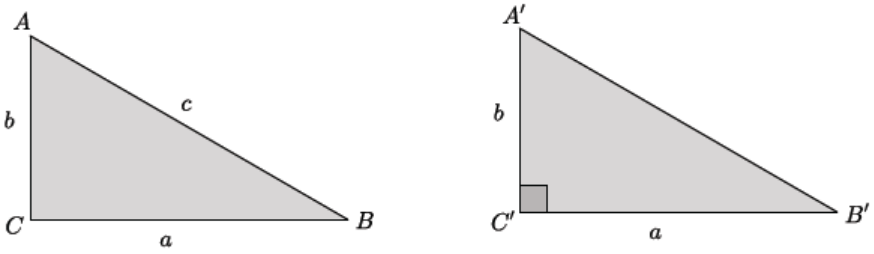




Lesson 16: Converse of the Pythagorean Theorem

Classwork

Proof of the Converse of the Pythagorean Theorem

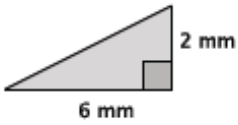


Exercises 1–7

1. Is the triangle with leg lengths of 3 mi., 8 mi., and hypotenuse of length $\sqrt{73}$ mi. a right triangle? Show your work, and answer in a complete sentence.

2. What is the length of the unknown side of the right triangle shown below? Show your work, and answer in a complete sentence. Provide an exact answer and an approximate answer rounded to the tenths place.

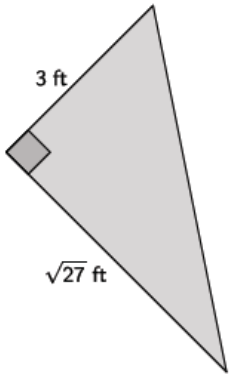
3. What is the length of the unknown side of the right triangle shown below? Show your work, and answer in a complete sentence. Provide an exact answer and an approximate answer rounded to the tenths place.



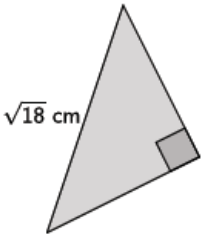
4. Is the triangle with leg lengths of 9 in., 9 in., and hypotenuse of length $\sqrt{175}$ in. a right triangle? Show your work, and answer in a complete sentence.

5. Is the triangle with leg lengths of $\sqrt{28}$ cm, 6 cm, and hypotenuse of length 8 cm a right triangle? Show your work, and answer in a complete sentence.

6. What is the length of the unknown side of the right triangle shown below? Show your work, and answer in a complete sentence.



7. The triangle shown below is an isosceles right triangle. Determine the length of the legs of the triangle. Show your work, and answer in a complete sentence.

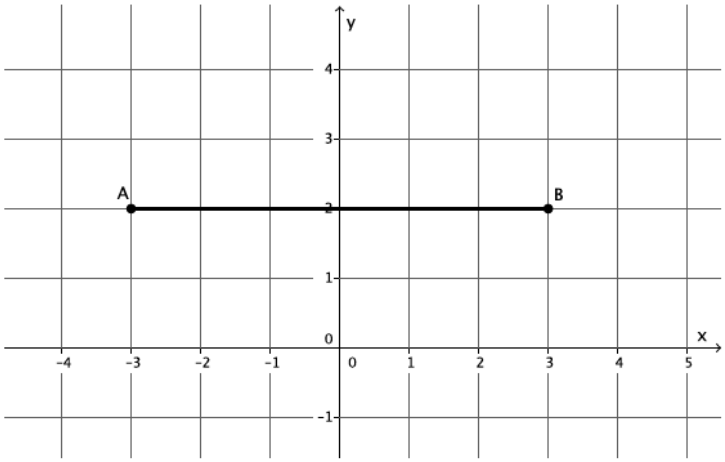


Lesson 17: Distance on the Coordinate Plane

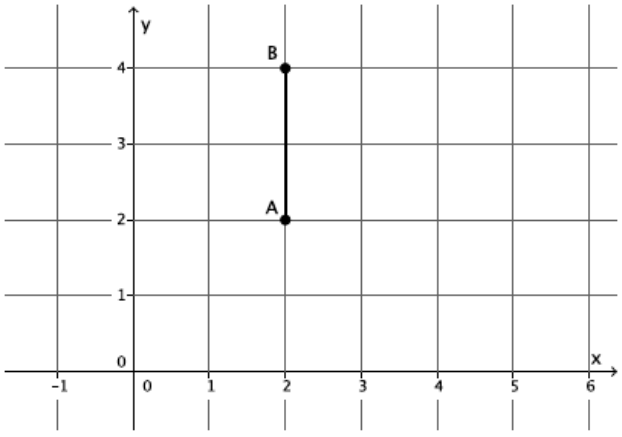
Classwork

Example 1

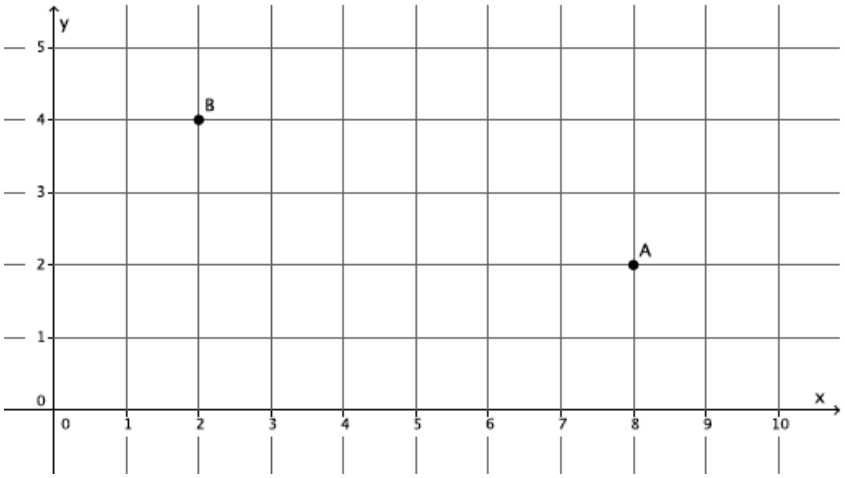
What is the distance between the two points A, B on the coordinate plane?



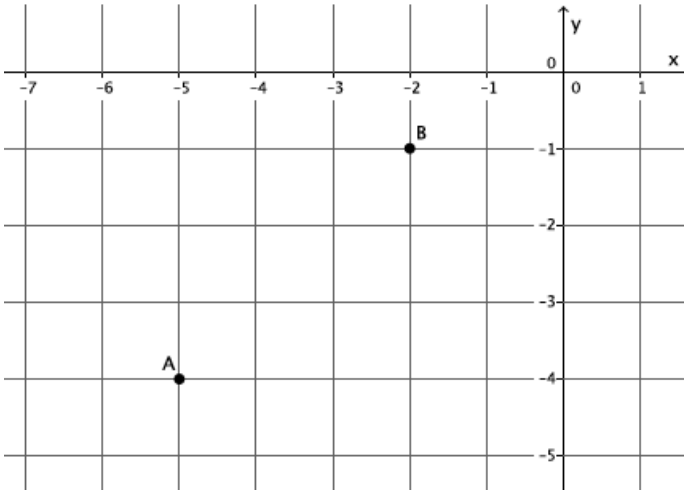
What is the distance between the two points A, B on the coordinate plane?



What is the distance between the two points A, B on the coordinate plane? Round your answer to the tenths place.



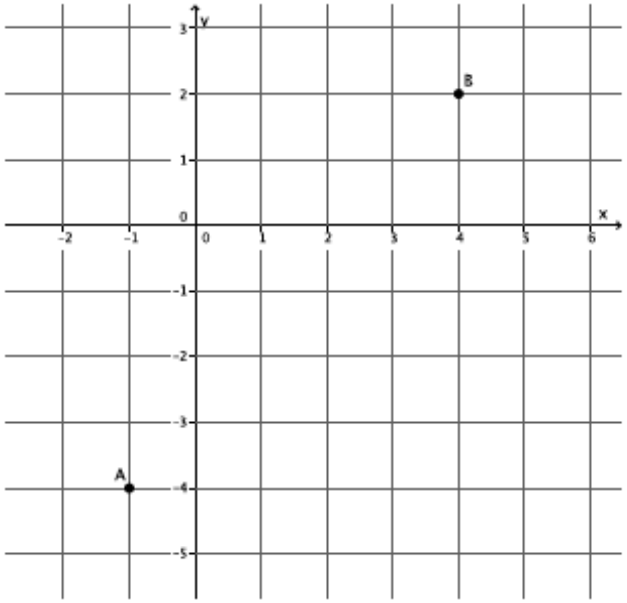
Example 2



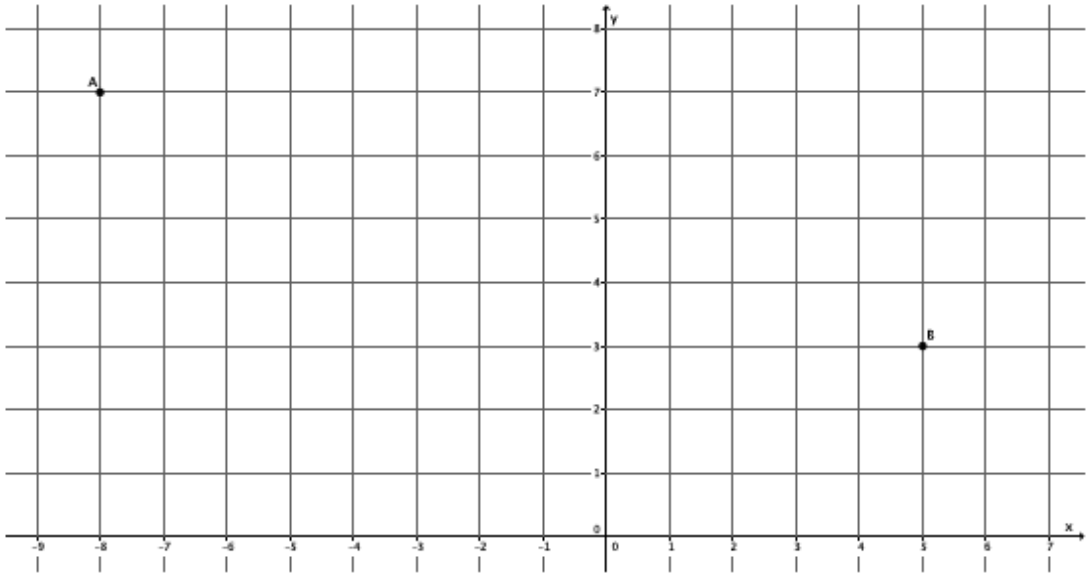
Exercises 1–4

For each of the Exercises 1–4, determine the distance between points A and B on the coordinate plane. Round your answer to the tenths place.

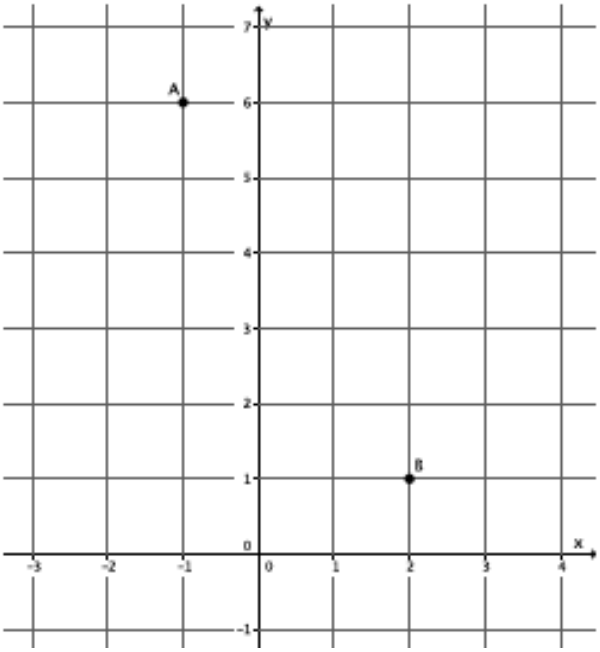
1.



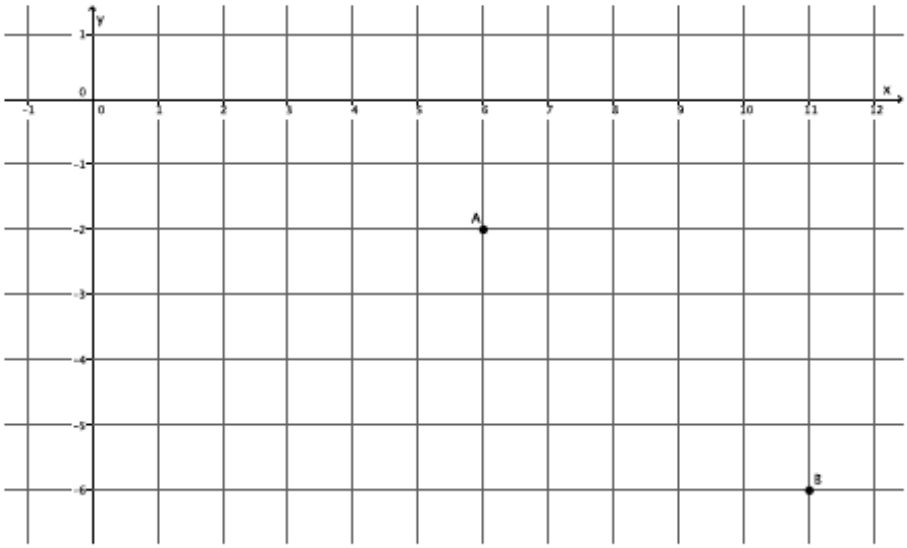
2.



3.

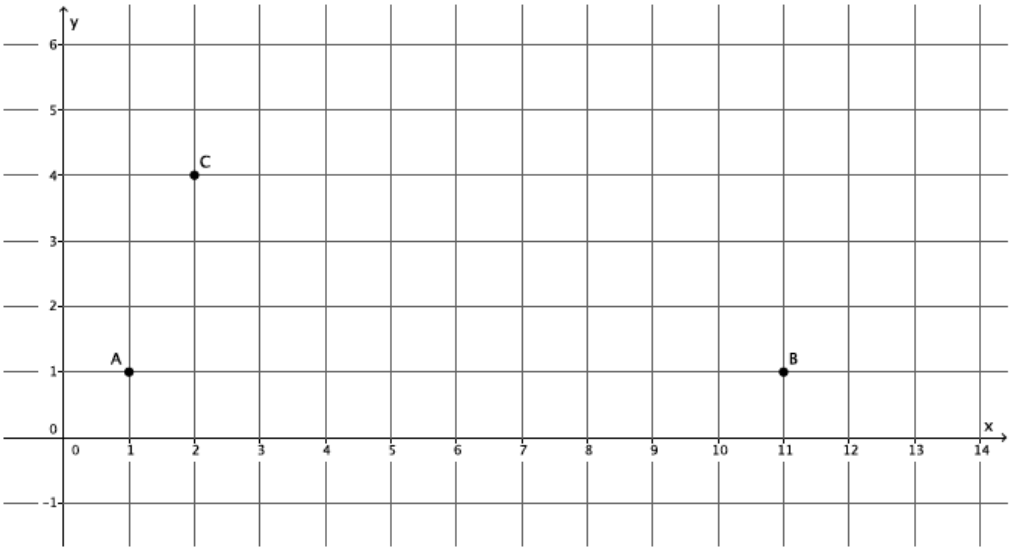


4.



Example 3

Is the triangle formed by the points A, B, C a right triangle?

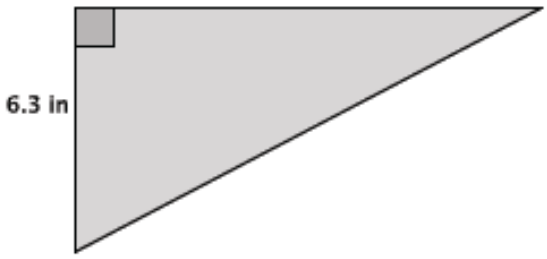


Lesson 18: Applications of the Pythagorean Theorem

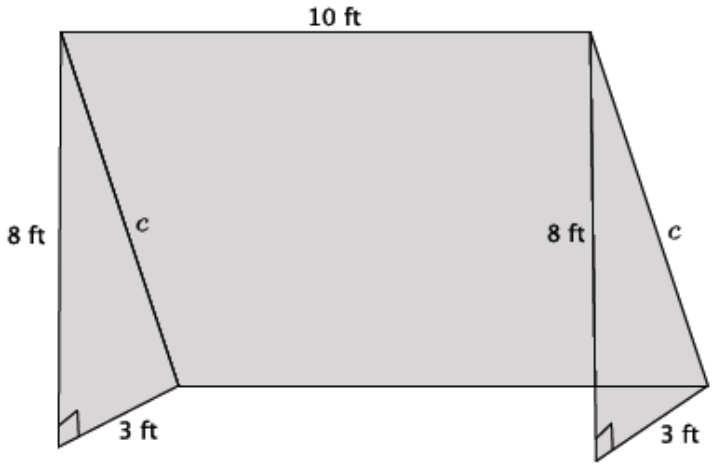
Classwork

Exercises 1–5

1. The area of the right triangle shown below is 26.46 in^2. What is the perimeter of the right triangle? Round your answer to the tenths place.



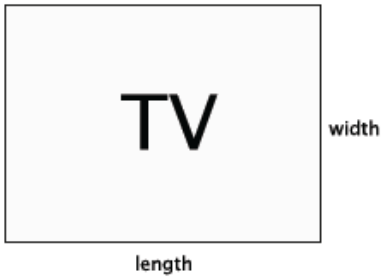
2. The diagram below is a representation of a soccer goal.



a. Determine the length of the bar, c, that would be needed to provide structure to the goal. Round your answer to the tenths place.

b. How much netting (in square feet) is needed to cover the entire goal?

3. The typical ratio of length to width that is used to produce televisions is $4:3$.



a. A TV with those exact measurements would be quite small, so generally the size of the television is enlarged by multiplying each number in the ratio by some factor of x. For example, a reasonably sized television might have dimensions of $4 \times 5 : 3 \times 5$, where the original ratio $4:3$ was enlarged by a scale factor of 5. The size of a television is described in inches, such as a 60" TV, for example. That measurement actually refers to the diagonal length of the TV (distance from an upper corner to the opposite lower corner). What measurement would be applied to a television that was produced using the ratio of $4 \times 5 : 3 \times 5$?

b. A 42" TV was just given to your family. What are the length and width measurements of the TV?

c. Check that the dimensions you got in part (b) are correct using the Pythagorean Theorem.

d. The table that your TV currently rests on is 30" in length. Will the new TV fit on the table? Explain.

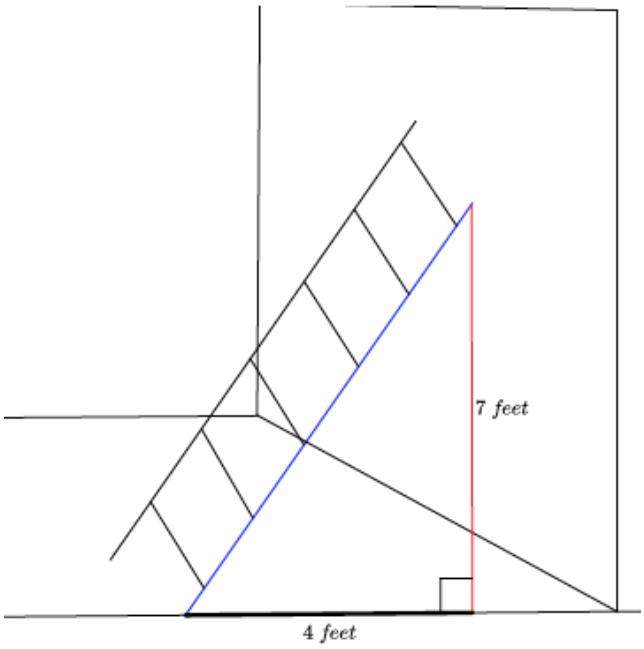
4. Determine the distance between the following pairs of points. Round your answer to the tenths place. Use graph paper if necessary.

   a. $(7, 4)$ and $(-3, -2)$

   b. $(-5, 2)$ and $(3, 6)$

   c. Challenge: (x_1, y_1) and (x_2, y_2). Explain your answer.

5. What length of ladder will be needed to reach a height of 7 feet along the wall when the base of the ladder is 4 feet from the wall? Round your answer to the tenths place.



Lesson 9: Examples of Functions from Geometry (from Module 5)

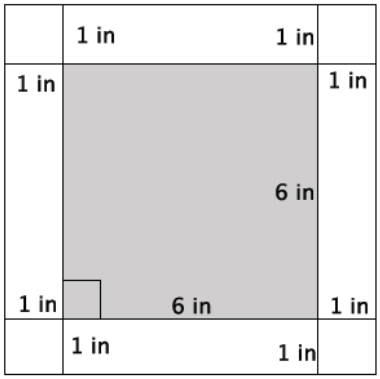
Classwork

Exercises

As you complete Exercises 1–4, record the information in the table below.

	Side length (s)	Area (A)	Expression that describes area of border
Exercise 1			
Exercise 2			
Exercise 3			
Exercise 4			

1. Use the figure below to answer parts (a)–(f).



a. What is the length of one side of the smaller, inner square?

b. What is the area of the smaller, inner square?

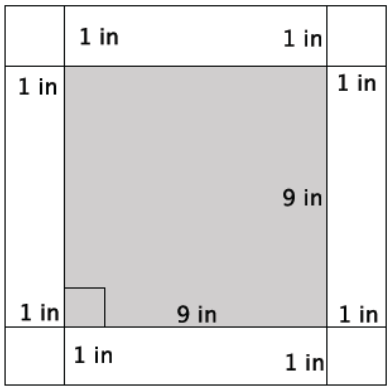
c. What is the length of one side of the larger, outer square?

d. What is the area of the larger, outer square?

e. Use your answers in parts (b) and (d) to determine the area of the 1-inch white border of the figure.

f. Explain your strategy for finding the area of the white border.

2. Use the figure below to answer parts (a)–(f).



a. What is the length of one side of the smaller, inner square?

b. What is the area of the smaller, inner square?

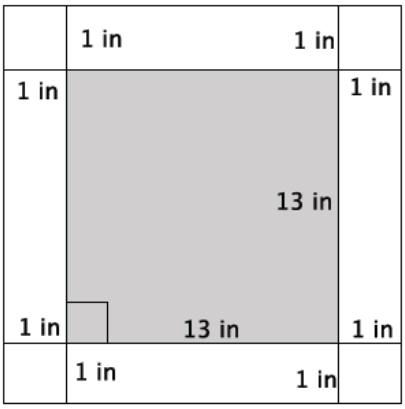
c. What is the length of one side of the larger, outer square?

d. What is the area of the larger, outer square?

e. Use your answers in parts (b) and (d) to determine the area of the 1-inch white border of the figure.

f. Explain your strategy for finding the area of the white border.

3. Use the figure below to answer parts (a)–(f).



a. What is the length of one side of the smaller, inner square?

b. What is the area of the smaller, inner square?

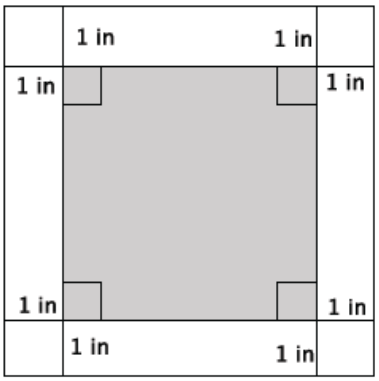
c. What is the length of one side of the larger, outer square?

d. What is the area of the larger, outer square?

e. Use your answers in parts (b) and (d) to determine the area of the 1-inch white border of the figure.

f. Explain your strategy for finding the area of the white border.

4. Write a function that would allow you to calculate the area of a 1-inch white border for any sized square picture measured in inches.



   a. Write an expression that represents the side length of the smaller, inner square.

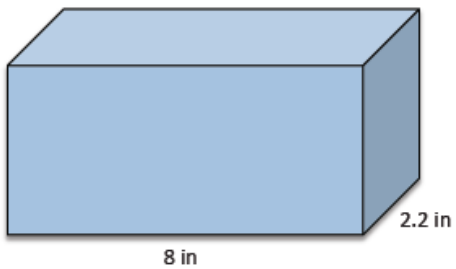
   b. Write an expression that represents the area of the smaller, inner square.

   c. Write an expression that represents the side lengths of the larger, outer square.

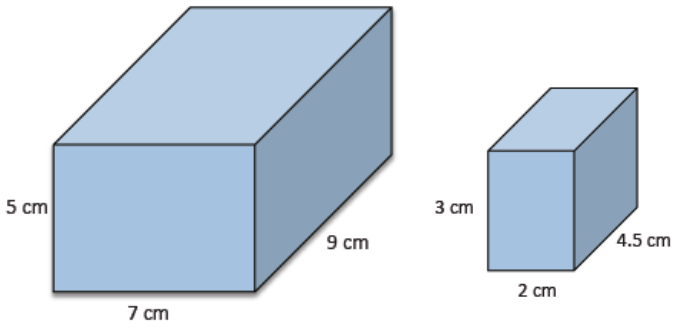
   d. Write an expression that represents the area of the larger, outer square.

   e. Use your expressions in parts (b) and (d) to write a function for the area A of the 1-inch white border for any sized square picture measured in inches.

5. The volume of the prism shown below is 61.6 in^3. What is the height of the prism?



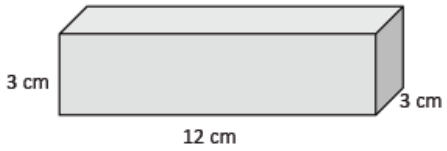
6. Find the value of the ratio that compares the volume of the larger prism to the smaller prism.



As you complete Exercises 7–10, record the information in the table below. Note that *base* refers to the bottom of the prism.

	Area of base (B)	Height (h)	Volume
Exercise 7			
Exercise 8			
Exercise 9			
Exercise 10			

7. Use the figure to the right to answer parts (a)–(c).

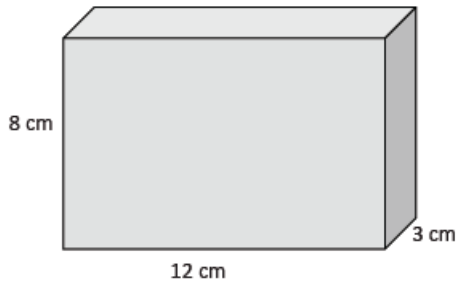


a. What is the area of the base?

b. What is the height of the figure?

c. What is the volume of the figure?

8. Use the figure to the right to answer parts (a)–(c).

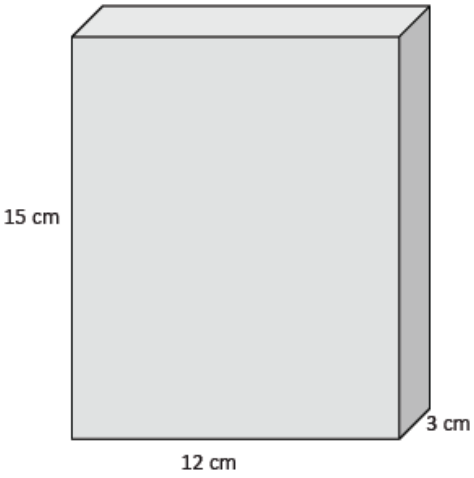


a. What is the area of the base?

b. What is the height of the figure?

c. What is the volume of the figure?

9. Use the figure to the right to answer parts (a)–(c).

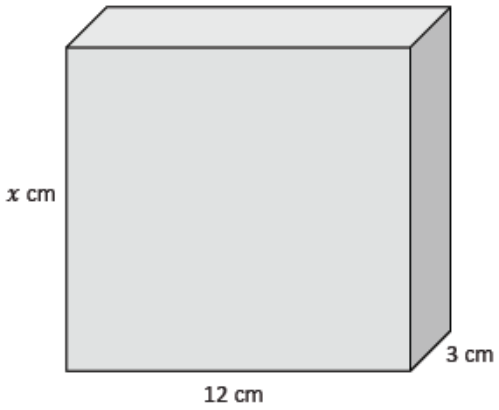


a. What is the area of the base?

b. What is the height of the figure?

c. What is the volume of the figure?

10. Use the figure to the right to answer parts (a)–(c).



a. What is the area of the base?

b. What is the height of the figure?

c. Write and describe a function that will allow you to determine the volume of any rectangular prism that has a base area of 36 cm^2.

Lesson 11: Volume of a Sphere (from Module 5)

Classwork

Exercises 1–3

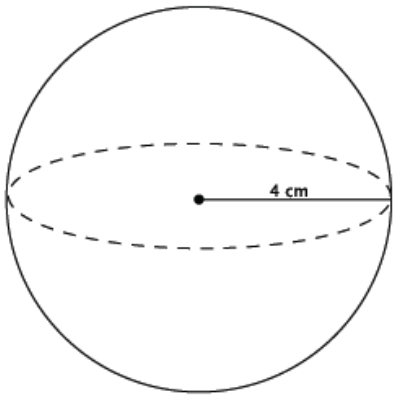
1. What is the volume of a cylinder?

2. What is the height of the cylinder?

3. If $\text{volume(sphere)} = \frac{2}{3}\text{volume(cylinder with same diameter and height)}$, what is the formula for the volume of a sphere?

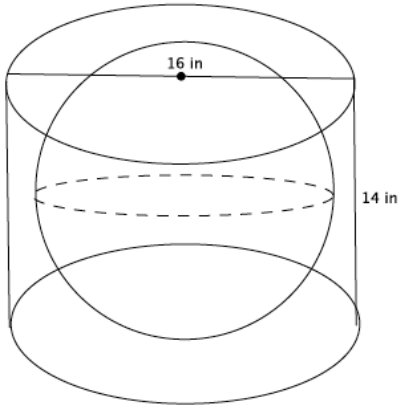
Example 1

Compute the exact volume for the sphere shown below.



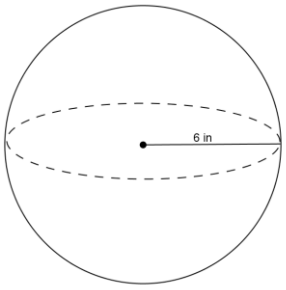
Example 2

A cylinder has a diameter of 16 inches and a height of 14 inches. What is the volume of the largest sphere that will fit into the cylinder?



Exercises 4–8

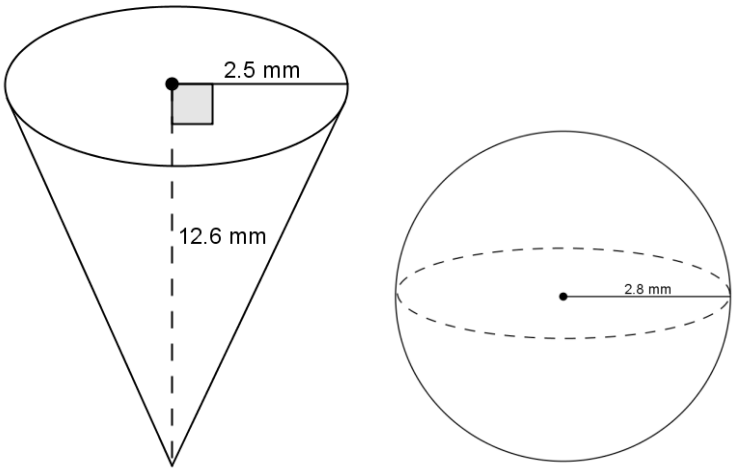
4. Use the diagram and the general formula to find the volume of the sphere.



5. The average basketball has a diameter of 9.5 inches. What is the volume of an average basketball? Round your answer to the tenths place.

6. A spherical fish tank has a radius of 8 inches. Assuming the entire tank could be filled with water, what would the volume of the tank be? Round your answer to the tenths place.

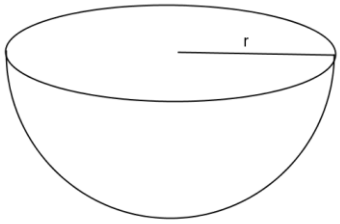
7. Use the diagram to answer the questions.



a. Predict which of the figures shown above has the greater volume. Explain.

b. Use the diagram to find the volume of each, and determine which has the greater volume.

8. One of two half spheres formed by a plane through the sphere's center is called a hemisphere. What is the formula for the volume of a hemisphere?



Lesson 19: Cones and Spheres

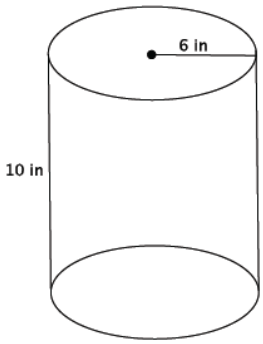
Classwork

Opening Exercises 1–2

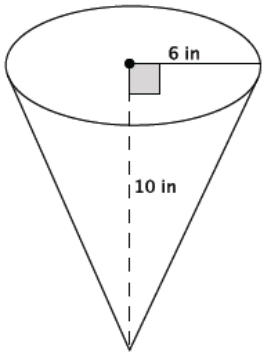
Note: Figures not drawn to scale.

1. Determine the volume for each figure below.

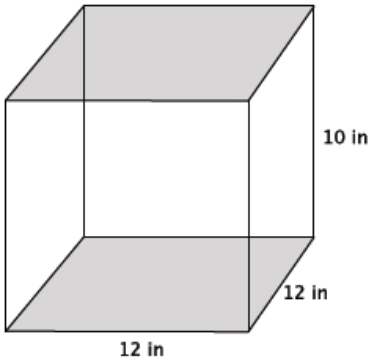
   a. Write an expression that shows volume in terms of the area of the base, B, and the height of the figure. Explain the meaning of the expression, and then use it to determine the volume of the figure.



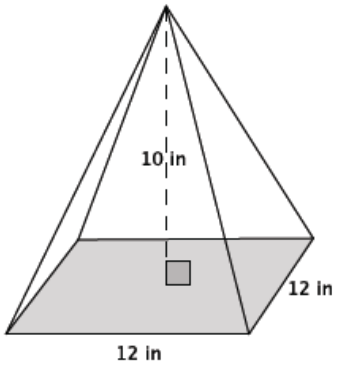
   b. Write an expression that shows volume in terms of the area of the base, B, and the height of the figure. Explain the meaning of the expression, and then use it to determine the volume of the figure.



2. a. Write an expression that shows volume in terms of the area of the base, B, and the height of the figure. Explain the meaning of the expression, and then use it to determine the volume of the figure.

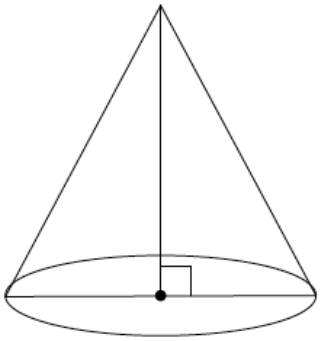


b. The volume of the pyramid shown below is 480 in^3. What do you think the formula to find the volume of a pyramid is? Explain your reasoning.



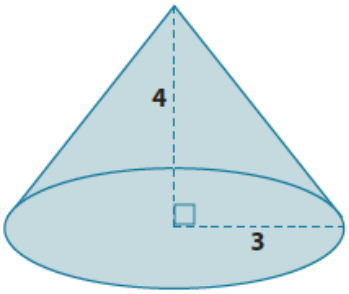
Example 1

State as many facts as you can about a cone.

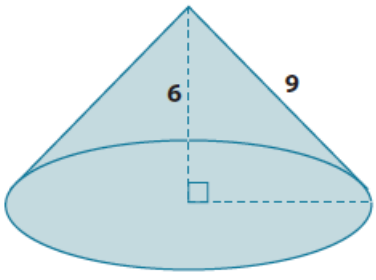


Exercises 3–10

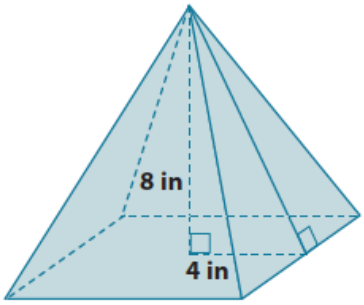
3. What is the lateral length of the cone shown below?



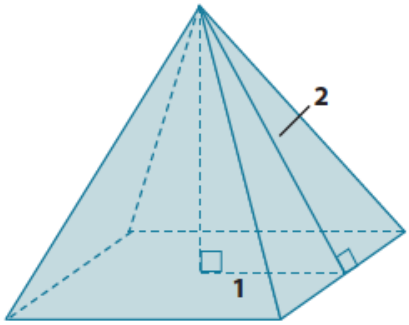
4. Determine the exact volume of the cone shown below.



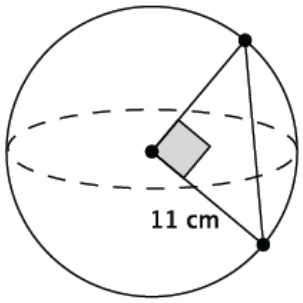
5. What is the lateral length (slant height) of the pyramid shown below? Give an exact square root answer and an approximate answer rounded to the tenths place.



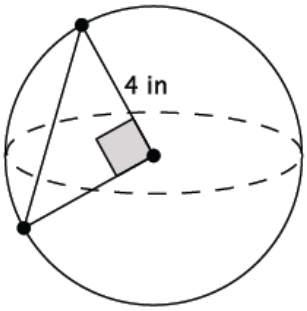
6. Determine the volume of the pyramid shown below. Give an exact answer using a square root.



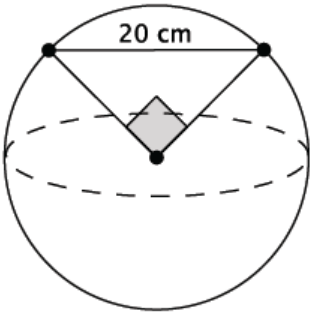
7. What is the length of the chord of the sphere shown below? Give an exact answer using a square root.



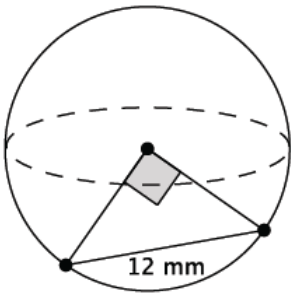
8. What is the length of the chord of the sphere shown below? Give an exact answer using a square root.



9. What is the volume of the sphere shown below? Give an exact answer using a square root.



10. What is the volume of the sphere shown below? Give an exact answer using a square root.



Lesson 20: Truncated Cones

Classwork

Opening Exercise 1

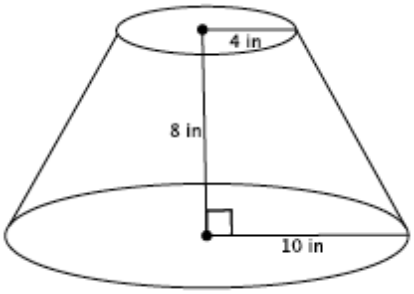
1. Examine the bucket below. It has a height of 9 inches and a radius at the top of the bucket of 4 inches.

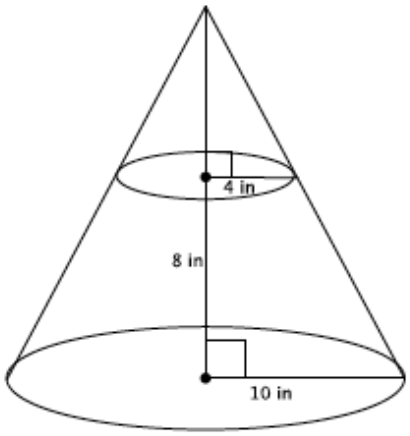
a. Describe the shape of the bucket. What is it similar to?

b. Estimate the volume of the bucket.

Example 1

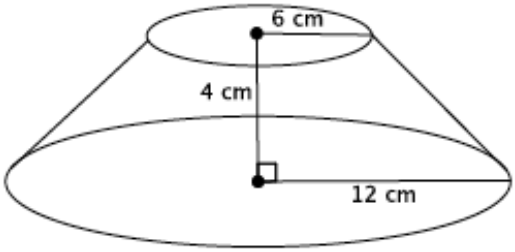
Determine the volume of the truncated cone shown below.





Exercises 2–6

2. Find the volume of the truncated cone.



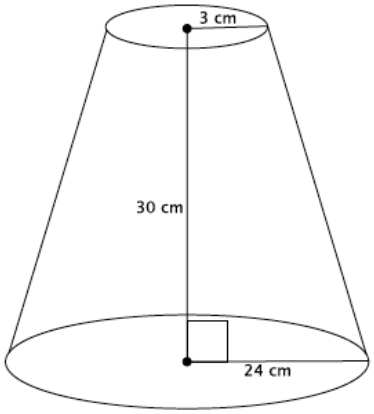
   a. Write a proportion that will allow you to determine the height of the cone that has been removed. Explain what all parts of the proportion represent.

   b. Solve your proportion to determine the height of the cone that has been removed.

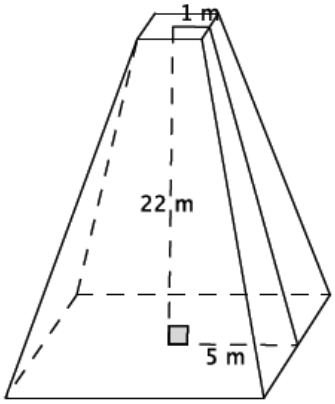
   c. Write an expression that can be used to determine the volume of the truncated cone. Explain what each part of the expression represents.

   d. Calculate the volume of the truncated cone.

3. Find the volume of the truncated cone.



4. Find the volume of the truncated pyramid with a square base.



a. Write a proportion that will allow you to determine the height of the cone that has been removed. Explain what all parts of the proportion represent.

b. Solve your proportion to determine the height of the pyramid that has been removed.

c. Write an expression that can be used to determine the volume of the truncated pyramid. Explain what each part of the expression represents.

d. Calculate the volume of the truncated pyramid.

5. A pastry bag is a tool used to decorate cakes and cupcakes. Pastry bags take the form of a truncated cone when filled with icing. What is the volume of a pastry bag with a height of 6 inches, large radius of 2 inches, and small radius of 0.5 inches?

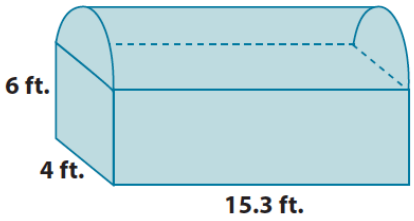
6. Explain in your own words what a truncated cone is and how to determine its volume.

Lesson 21: Volume of Composite Solids

Classwork

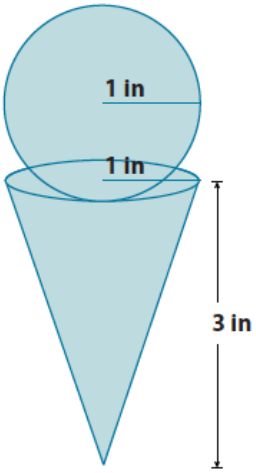
Exercises 1–4

1. a. Write an expression that can be used to find the volume of the chest shown below. Explain what each part of your expression represents.



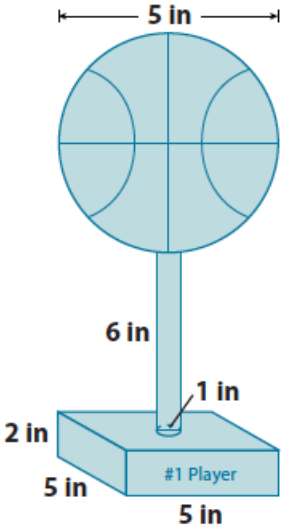
b. What is the approximate volume of the chest shown below? Use 3.14 for π. Round your final answer to the tenths place.

2. a. Write an expression that can be used to find the volume of the figure shown below. Explain what each part of your expression represents.



b. Assuming every part of the cone can be filled with ice cream, what is the exact and approximate volume of the cone and scoop? (Recall that exact answers are left in terms of π and approximate answers use 3.14 for π). Round your approximate answer to the hundredths place.

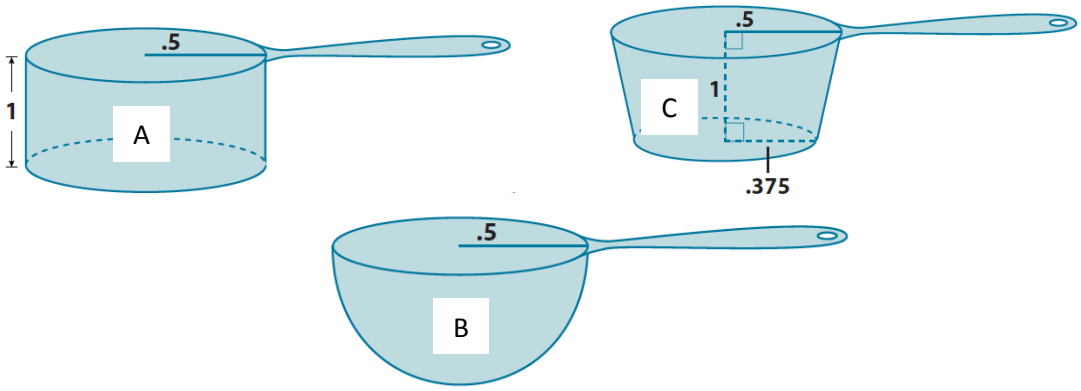
3. a. Write an expression that can be used to find the volume of the figure shown below. Explain what each part of your expression represents.



b. Every part of the trophy shown below is made out of silver. How much silver is used to produce one trophy? Give an exact and approximate answer rounded to the hundredths place.

4. Use the diagram of scoops below to answer parts (a) and (b).

a. Order the scoops from least to greatest in terms of their volumes. Each scoop is measured in inches.



b. How many of each scoop would be needed to add a half-cup of sugar to a cupcake mixture? (One-half cup is approximately 7 in^3.) Round your answer to a whole number of scoops.